CLAIMS:

1. A system for creating a combinatorial coating sensor library comprising:

a delivery mechanism in fluid communication with a source of organic polymer reactants and a substrate having at least one delivery area;

a reaction source operative to apply at least one reactive environment to the delivery area; and

a controller in communication with the delivery mechanism in a manner effective to apply a plurality of organic reactants to the substrate, and further wherein the controller is in communication with the reaction source in a manner effective to react at least one of the plurality of organic reactants on the substrate into an organic block copolymer coating.

2. The system of Claim 1, wherein the substrate comprises a detector for analytes.

3. The system of Claim 1, wherein the detector is an acoustic wave device or a quartz crystal microbalance device.

4. The system of Claim 1, wherein the acoustic wave operates in the thickness-shear mode, surface acoustic wave mode, acoustic plate mode, flexural plate wave mode, and surface transverse wave mode.

5. The system of Claim 1, wherein the organic block copolymer has the structure of formula

$$\begin{array}{ccc} N & & L \\ | & & | \\ A_m & - & B_n \\ | & & | \\ M & & K \end{array}$$

wherein A represents a first segment comprising an organic polymer having a glass transition greater than or equal to about room temperature and B represents a second segment comprising an organic polymer having a glass transition less than room temperature, K, L, M and N are the same or different and represent functional groups.

6. The system of Claim 5, wherein the first segment has a glass transition greater than or equal to about 23°C and wherein the second segment has a glass transition temperature of less than 23°C.

7. The system of Claim 6, wherein the first segment is an organic polymer, wherein the organic polymer is polyacetal, polyacrylic, polycarbonate, polystyrene, polyester, polyamide, polyamideimide, polyarylate, polyarylsulfone, polyethersulfone, polyphenylene sulfide, polyvinyl chloride, polysulfone, polyimide, polyetherimide, polytetrafluoroethylene, polyetherketone, polyether etherketone, polyether ketone ketone, polybenzoxazoles, polyoxadiazoles, polybenzothiazinophenothiazines, polybenzothiazoles, polypyrazinoquinoxalines, polypyromellitimides, polyquinoxalines, polybenzimidazoles, polyoxindoles, polyoxoisoindolines, polydioxoisoindolines, polytriazines, polypyridazines, polypiperazines, polypyridines, polypiperidines, polytriazoles, polypyrazoles, polypyrrolidines, polycarboranes, polyoxabicyclononanes, polydibenzofurans, polyphthalides, polyacetals, polyanhydrides, polyvinyl ethers, polyvinyl thioethers, polyvinyl alcohols, polyvinyl ketones, polyvinyl halides, polyvinyl nitriles, polyvinyl esters, polysulfonates, polysulfides, polythioesters, polysulfones, polysulfonamides, polyureas, polyphosphazenes, polysilazanes, or a combination comprising at least one of the foregoing first segments.

8. The system of Claim 6, wherein the second segment is an organic polymer, wherein the organic polymer is a polybutadiene, polyisoprene, polysiloxane, polychloroprene, amorphous copolymers of ethylene and propylene, butyl rubber, styrene-butadiene rubber, nitrile rubber, ethylene vinyl acetate rubber, acrylic rubber, fluorine rubber, carboxynitroso rubber, ethylene-vinylacetate rubber, phosphazine rubber, polysulfide rubber, or a combination comprising at least one of the foregoing organic polymers.

9. The system of Claim 6, wherein the first segment is a polyimide and the second segment is a polysiloxane.

10. The system of Claim 9, wherein the polyimide is formed by the reaction of a dianhydride with a diamine.

11. The system of Claim 1, wherein the organic block copolymer coating has a partition coefficient of greater than or equal to about 10^4.

12. The system of Claim 1, wherein the organic block copolymer coating has a partition coefficient of greater than or equal to about 10^5.

13. The system of Claim 1, wherein the sensor library comprises at least one organic block copolymer that provides for detecting an analyte, and wherein the analyte is present in an amount of less than or equal to about 1 part per million parts.

14. The system of Claim 1 wherein the sensor library comprises at least one organic block copolymer that provides for detecting an analyte, and wherein the analyte is present in an amount of less than or equal to about 1 part per billion parts.

15. The system of Claim 5, wherein the functional groups are bromo groups, chloro groups, iodo groups, fluoro groups, amino groups, hydroxyl groups, thio groups, phosphino groups, alkylthio groups, cyano groups, nitro groups, amido groups, carboxyl groups, aryl groups, heterocyclyl groups, ferrocenyl groups, heteroaryl groups, alkyl groups, aryl groups, alkaryl groups, aralkyl groups, fluoro substituted alkyl groups, ester groups, ketone groups, carboxylic acid groups, alcohol groups, fluoro-substituted carboxylic acid groups, fluoro-alkyl-triflate groups, or a combination comprising at least one of the foregoing functional groups.

16. A method for creating a sensor array comprising:

delivering a plurality of organic reactants in a quantity effective to form a block copolymer to at least one predefined region positioned within a delivery area of a substrate;

reacting the plurality of organic reactants in at least one of the predefined regions to form an organic block copolymer coating, and wherein the organic block copolymer coating in conjunction with at least the substrate is capable of detecting the presence of an analyte in amounts of less than 1 part per million parts.

17. The method of Claim 16, wherein the substrate is a detector for analytes.

18. The method of Claim 17, wherein the detector is an acoustic wave device or a quartz crystal microbalance device.

19. The method of Claim 16, wherein the organic block copolymer comprises a first segment and a second segment.

20. The method of Claim 19, wherein the first segment has a glass transition greater than or equal to about 23°C and wherein the second segment has a glass transition temperature of less than 23°C.

21. The method of Claim 20, wherein the first segment is an organic polymer, and wherein the organic polymer is polyacetal, polyacrylic, polycarbonate, polystyrene, polyester, polyamide, polyamideimide, polyarylate, polyarylsulfone, polyethersulfone, polyphenylene sulfide, polyvinyl chloride, polysulfone, polyimide, polyetherimide, polytetrafluoroethylene, polyetherketone, polyether etherketone, polyether ketone ketone, polybenzoxazoles, polyoxadiazoles, polybenzothiazinophenothiazines, polybenzothiazoles, polypyrazinoquinoxalines, polypyromellitimides, polyquinoxalines, polybenzimidazoles, polyoxindoles, polyoxoisoindolines, polydioxoisoindolines, polytriazines, polypyridazines, polypiperazines, polypyridines, polypiperidines, polytriazoles, polypyrazoles, polypyrrolidines, polycarboranes, polyoxabicyclononanes, polydibenzofurans, polyphthalides, polyacetals, polyanhydrides, polyvinyl ethers, polyvinyl thioethers, polyvinyl alcohols, polyvinyl ketones, polyvinyl halides, polyvinyl nitriles, polyvinyl esters, polysulfonates, polysulfides, polythioesters, polysulfones, polysulfonamides, polyureas, polyphosphazenes, polysilazanes or a combination comprising at least one of the foregoing organic polymers.

22. The method of Claim 20, wherein the second segment is an organic polymer, and wherein the organic polymer is a polybutadiene, polyisoprene, polysiloxane, polychloroprene, amorphous copolymers of ethylene and propylene, butyl rubber, styrene-butadiene rubber, nitrile rubber, ethylene vinyl acetate rubber, acrylic rubber, fluorine rubber, carboxynitroso rubber, ethylene-vinylacetate rubber, phosphazine rubber, polysulfide rubber, or a combination comprising at least one of the foregoing organic polymers.

23. The method of Claim 20, wherein the first segment is a polyimide and the second segment is a polysiloxane.

24. The method of Claim 20, wherein the polyimide is formed by the reaction of a dianhydride with a diamine.

25. The method of Claim 16, wherein the organic block copolymer coating has a partition coefficient of greater than or equal to about 10^5 towards at least one analyte.

26. The method of Claim 16, wherein the coating has a thickness of about 0.1 nanometers to about 100 micrometers.

27. The method of Claim 16, wherein the reacting is conducted by reaction source comprising ultraviolet radiation, infrared radiation, thermal radiation, microwave radiation, visible radiation, narrow-wavelength radiation, laser light, convectional heating, conductional heating, humidity, peroxides, catalysts, or combinations comprising at least one of the foregoing reaction sources.

28. The method of Claim 16, further comprising removing at least one unreacted species.

29. A sensor comprising:

an organic block copolymer coating disposed upon a detection device; wherein the detection device comprises and acoustic wave device or a quartz crystal microbalance device and further wherein the organic block copolymer coating has a partition coefficient of greater than or equal to about 10^5 towards at least one analyte.

30. The sensor of Claim 29, wherein the coating has a thickness of about 0.1 nanometers to about 100 micrometers.

31. The sensor of Claim 29, wherein the organic block copolymer coating comprises at least a first segment and a second segment.

32. The sensor of Claim 31, wherein the first segment has a glass transition greater than or equal to about 23°C and wherein the second segment has a glass transition temperature of less than 23°C.

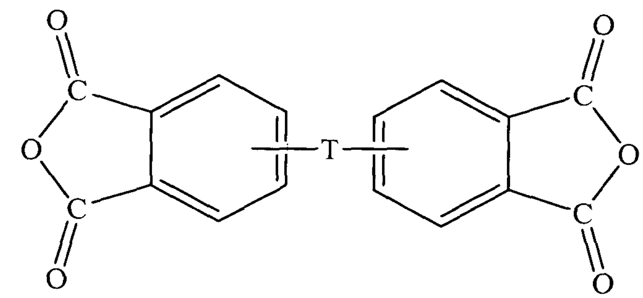
33. The sensor of Claim 32, wherein the first segment is an organic polymer, and wherein the organic polymer is polyacetal, polyacrylic, polycarbonate, polystyrene, polyester, polyamide, polyamideimide, polyarylate, polyarylsulfone, polyethersulfone, polyphenylene sulfide, polyvinyl chloride, polysulfone, polyimide, polyetherimide, polytetrafluoroethylene, polyetherketone, polyether etherketone, polyether ketone ketone, polybenzoxazoles, polyoxadiazoles, polybenzothiazinophenothiazines, polybenzothiazoles, polypyrazinoquinoxalines, polypyromellitimides, polyquinoxalines, polybenzimidazoles, polyoxindoles, polyoxoisoindolines, polydioxoisoindolines, polytriazines, polypyridazines, polypiperazines, polypyridines, polypiperidines, polytriazoles, polypyrazoles, polypyrrolidines, polycarboranes, polyoxabicyclononanes, polydibenzofurans, polyphthalides, polyacetals, polyanhydrides, polyvinyl ethers, polyvinyl thioethers, polyvinyl alcohols, polyvinyl ketones, polyvinyl halides, polyvinyl nitriles, polyvinyl esters, polysulfonates, polysulfides, polythioesters, polysulfones, polysulfonamides, polyureas, polyphosphazenes, polysilazanes, or a combination comprising at least one of the foregoing organic polymers.

34. The sensor of Claim 32, wherein the second segment is an organic polymer, and wherein the organic polymer is a polybutadiene, polyisoprene, polysiloxane, polychloroprene, amorphous copolymers of ethylene and propylene, butyl rubber, styrene-butadiene rubber, nitrile rubber, ethylene vinyl acetate rubber, acrylic rubber, fluorine rubber, carboxynitroso rubber, ethylene-vinylacetate rubber, phosphazine rubber, polysulfide rubber, or a combination comprising at least one of the foregoing organic polymers.

35. The sensor of Claim 32, wherein the first segment is a polyimide and the second segment is a polysiloxane.

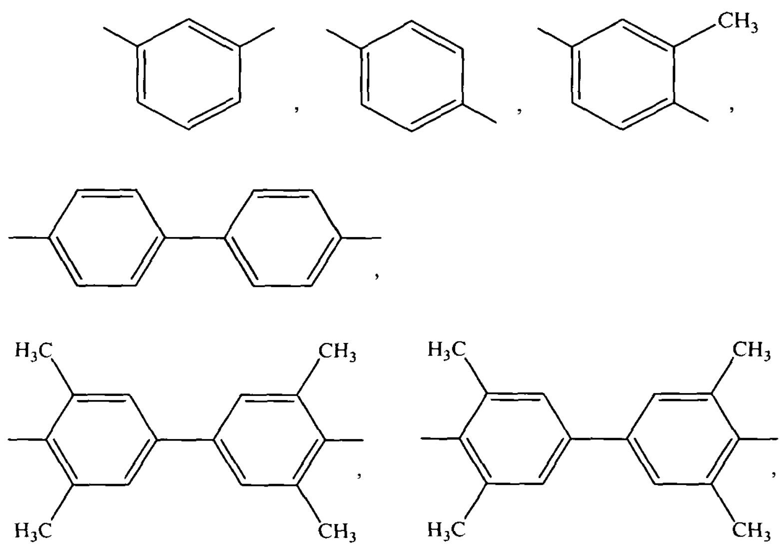
36. The sensor of Claim 32, wherein the polyimide is formed by the reaction of a dianhydride with a diamine.

37. The sensor of Claim 36, wherein the dianhydride has the structure of formula (II)

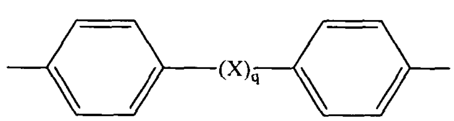


(II)

wherein the divalent T moiety bridges the 3,3', 3,4', 4,3', or 4,4' positions of the aryl rings; T is -O- or a group of the formula -O-Z-O-; Z is a divalent radical selected from the following formulae (III)



and



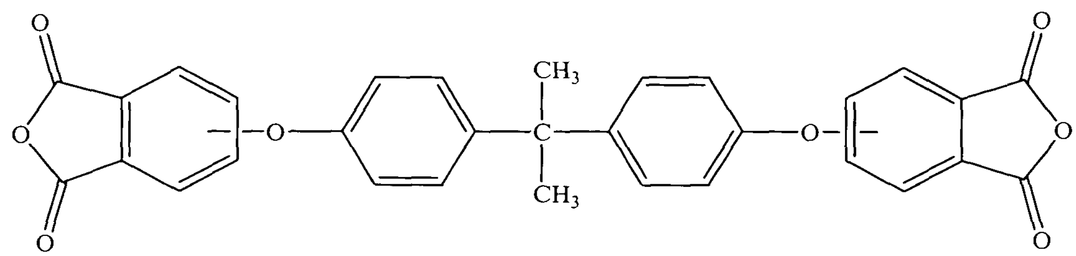
(III)

wherein X is a member selected from divalent radicals of the formulae (IV)

$$-C_yH_{2y}- \quad , \quad -\overset{\overset{\displaystyle O}{\|}}{C}- \quad , \quad -\underset{\underset{\displaystyle O}{\|}}{\overset{\overset{\displaystyle O}{\|}}{S}}- \quad , \quad -O- \quad \text{, and} \quad -S- \qquad \text{(IV)}$$

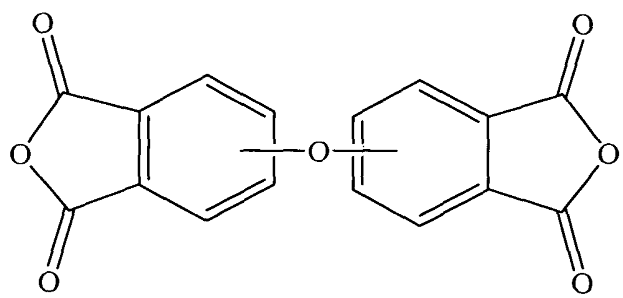
y is an integer of 1 to about 5, and q is 0 or 1.

38. The sensor of Claim 36, wherein the dianhydride is bisphenol A dianhydride (BPADA), which consists of one or more isomers having the structure of formula (V),



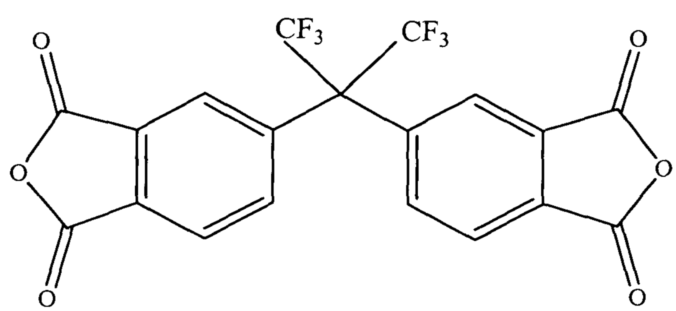
(V)

4,4'-oxy-diphthalic anhydride (ODPA), which consists of one or more isomers having the structure of formula (VI),



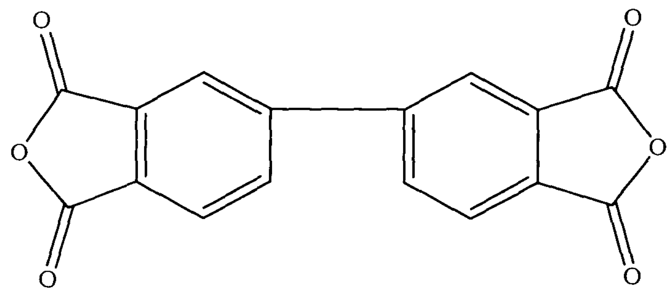
(VI)

hexafluorodipropane dianhydride (6FDA), which comprises one of more isomers having the structure of formula (VII),



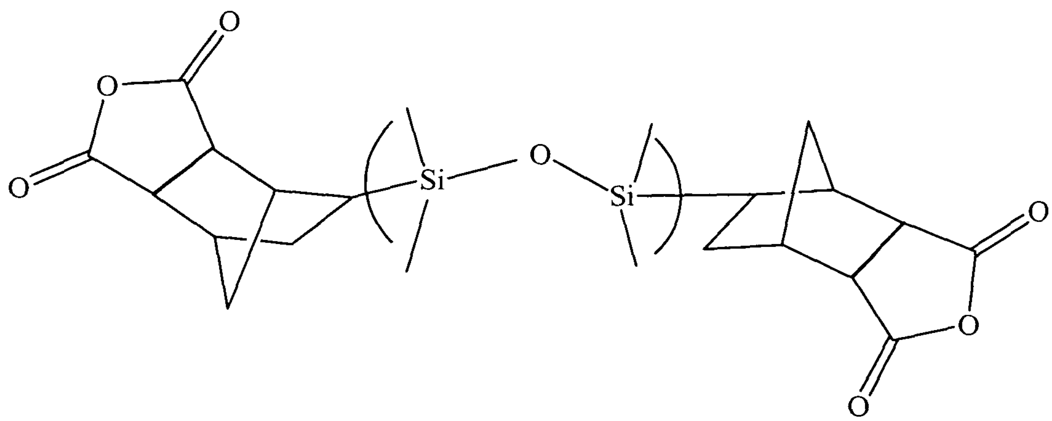
(VII)

4,4'-bisphthalic anhydride (BDA), which comprises one of more isomers having the structure of formula (VIII),



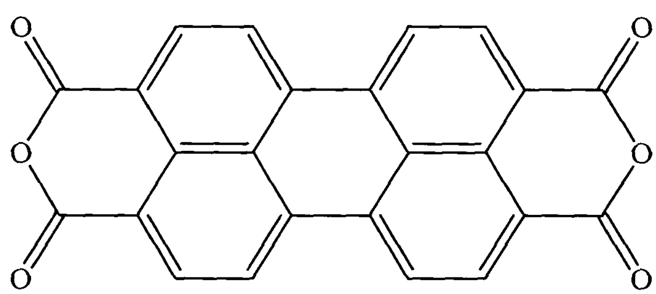
(VIII)

an isomer having the structure of formula (IX),



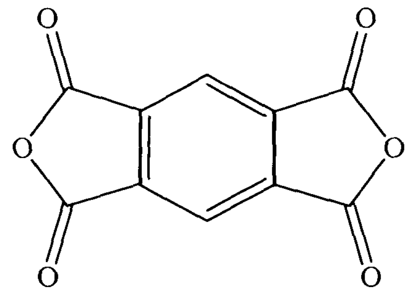
(IX)

3,4,9,10-perylenetetracarboxylic dianhydride having the structure of formula (X),



(X)

pyromellitic dianhydride having the structure of formula (XI)



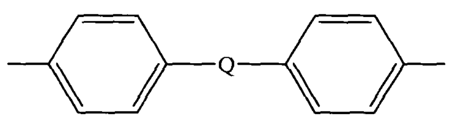
(XI)

or a combination comprising at least one of the foregoing dianhydrides.

39. The sensor of Claim 36, wherein the diamine has the structure of the formula (XII)

$$H_2N\text{—}R\text{—}NH_2 \qquad \text{(XII)}$$

wherein R is a divalent organic radical selected from (a) aromatic hydrocarbon radicals having 6 to about 20 carbon atoms and halogenated derivatives thereof, (b) alkylene radicals having 2 to about 20 carbon atoms, (c) cycloalkylene radicals having 3 to about 20 carbon atoms, and (d) divalent radicals of the general formula (XIII)



(XIII)

where Q is a covalent bond or a member selected from the formulae

$$\text{—}C_{y'}H_{2y'}\text{—}\ ,\quad \text{—}\overset{\overset{\displaystyle O}{\|}}{C}\text{—}\ ,\quad \text{—}\underset{\underset{\displaystyle O}{\|}}{\overset{\overset{\displaystyle O}{\|}}{S}}\text{—}\ ,\quad \text{—}O\text{—}\ ,\ \text{and}\quad \text{—}S\text{—} \qquad \text{(XIV)}$$

where y' is an integer from 1 to about 5.

40. The sensor of Claim 36, wherein the diamine is m-phenylenediamine, p-phenylenediamine, bis(4-aminophenyl)methane, bis(4-aminophenyl)ether, hexamethylenediamine, bisphenol A diamine, 1,4-cyclohexanediamine, diaminodiphenylsulfones or a combination comprising at least one of the foregoing diamines.

41. The sensor of Claim 29, wherein the organic block copolymer coating is semi-crystalline.